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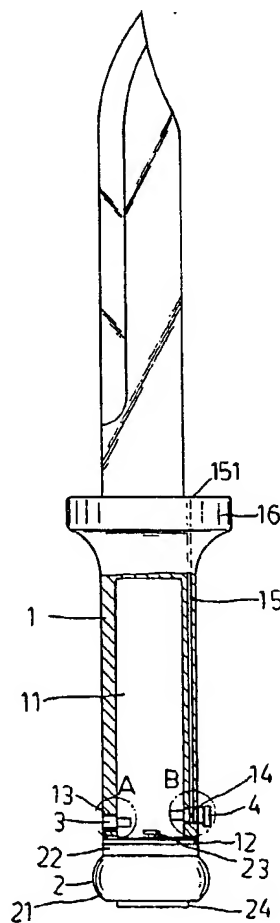
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## (54) Diver's knife

(57) The present invention relates to a diver's knife comprising a blade and a handle 1 having an air chamber 11 therein. The air chamber is sealed by means of a removable air-tight closure member 2 and it is provided with an inlet valve 3 through which air may be supplied to the chamber and a selectively operable outlet valve 4 through which air may be discharged from the chamber. The closure member may be removed to admit a pigment and/or a shark repellent to the air chamber. When a diver is threatened by a dangerous sea creature he may operate the outlet valve to release pressurised air which causes the water to become turbid, and a pigment and/or shark repellent to further facilitate his escape.



F I G.2

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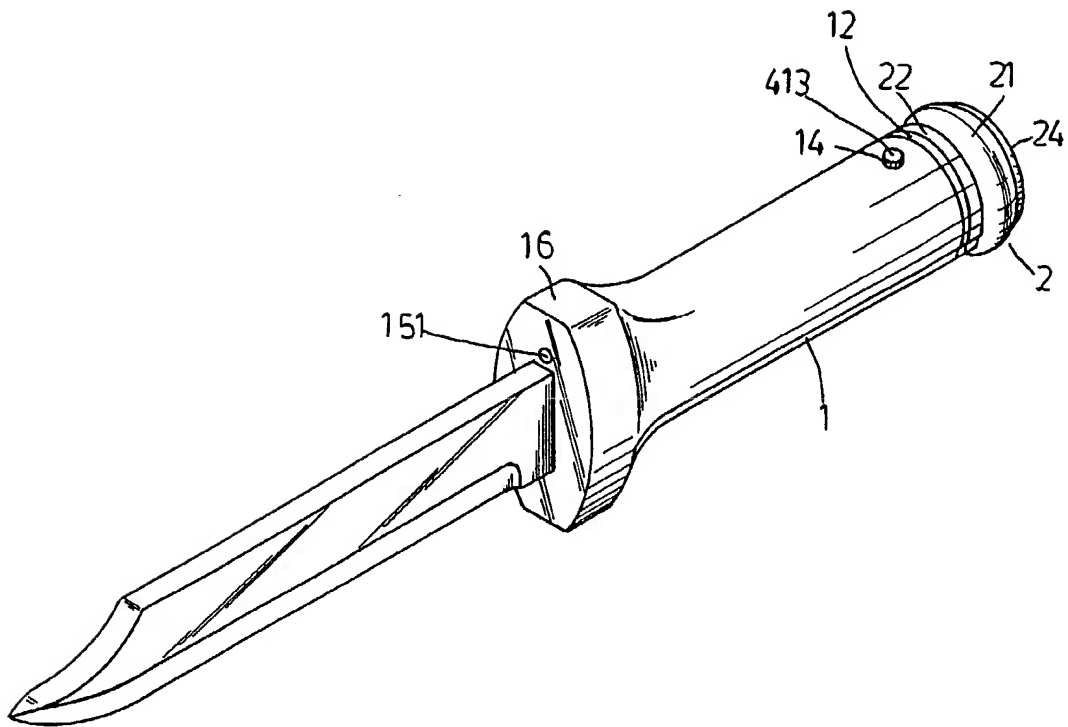


FIG. 1

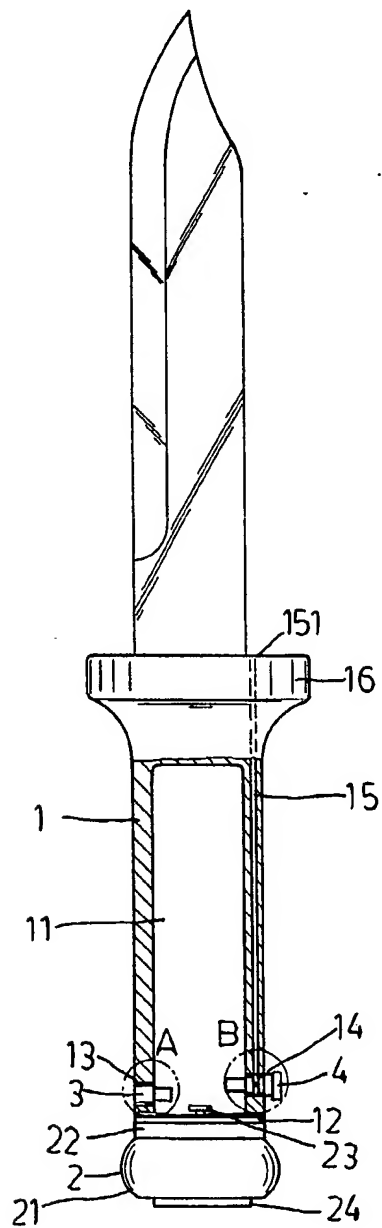


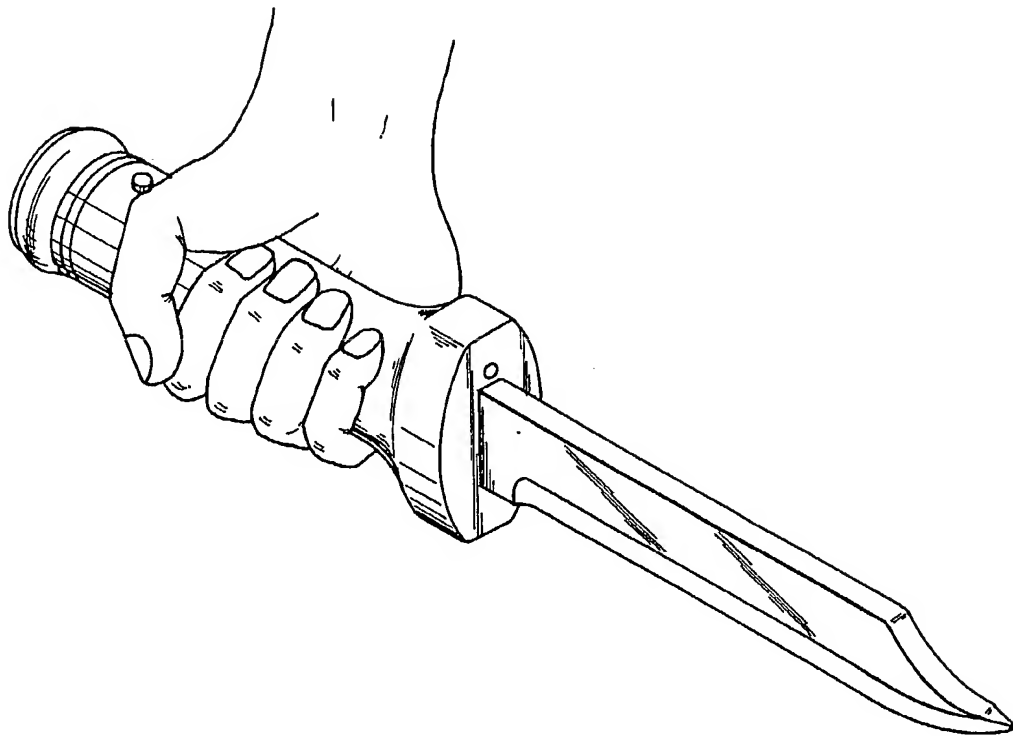
FIG. 2

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F I G.3

# SPECIFICATION Diver's Knife

The present invention relates to a water escape knife, exclusively used by divers for personal protection, wherein a capacity chamber is provided in the inner part of the body of the knife holder; a seal cover having a pressure gauge tightly locks it from the knife holder end, an air tap and a valve gate are provided at proper positions on the knife holder and are communicable to the capacity chamber in the inner part of the knife holder. In addition, an air discharge channel is present in the wall body of the knife holder located on one side of the valve gate and is subjected to the valve gate and used for venting the air in the inner part of the capacity chamber. In practice we may fill a color pigment and/or an anti-shark substance in the capacity chamber in advance, and also pump air/gas in the air tap to be stored in the empty capacity chamber for mixing with the color pigment and/or the anti-shark substance. When a diver confronts danger in the water, he may depress the valve gate to let the air/gas in the capacity chamber discharge from the air discharge channel *v/a* the valve gate, thus making the seawater around the diver become turbid for easy escape, and from the pressure gauge on the seal cover he knows the remaining volume of air/gas stored in the capacity chamber for giving a proper resupply at any time.

Outdoor sport is a popular pastime, and in recent years water sports such as scuba diving have been increasing in popularity, especially in Europe and America. However, there are many hazards associated with the sea, among these being marine creatures which may attack people. In the event of such an assault the only means a diver has to resist the attacker is his fishing gun or sailing knife and escape is difficult because humans move less quickly and agilely and are sooner exhausted than marine creatures.

It is an object of the present invention to obviate or mitigate the abovementioned problems.

The invention will be further described by way of example only with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of one embodiment of knife in accordance with the present invention, Figure 2 is a side view of one embodiment of the divers knife of Figure 1, with the handle shown in cross-section,

Figure 2-A is a cross sectional view of the air tap in the divers knife of Figure 1,

Figure 2-B is the structural cross sectional view of the valve gate in the divers knife of Figure 1.

Figure 3 shows the use of the divers knife of Figure 1.

Referring to Figure 1, the knife comprises a knife holder (1), a seal cover (2), an air tap (3) and a valve gate (4);

Referring to Figure 2, the knife holder (1) has a grip handle part. The inner side of said knife holder (1) is cut out into a capacity chamber (11). Threads are made on the end of the knife holder (1) and then sleeved on a rubber pad ring (12) for the seal cover

(2) to achieve tight locking and closure. An air tap hole (13) and a valve gate hole (14) are located respectively in the upper and lower positions at the end of the knife holder (1) for joining the air tap (3) and the valve gate (4) respectively. A copper tube on the side wall of the valve gate (4) to cover the knife holder (1) when the knife holder (1) is ejected out into a single formation to become an air passage (15). One end of said air passage (15) is subjected to the control of the valve gate (4), while its other end is formed into an outlet (151) by the outlet of the protective lip (16) on the front end of the knife holder (1). When the valve gate (4) is depressed, the air discharge hole (421) of the valve gate (4) becomes communicable to the air passage (16) which in turn makes the air/gas in the capacity chamber (11) discharged; when the air/gas storage volume in the capacity chamber is sufficient, we can resupply the air/gas from the air tap (3). Furthermore, when and if all the color pigment and/or the anti-shark substance in the capacity chamber (11) is used up, the seal cover (2) may be opened (only under the condition that the pressure in the capacity chamber (11) is zero) to refill the color pigment and/or the anti-shark substance.

The seal cover (2) has a cover body (21), which extends down a locking seat (22). The said locking seat (22) and the end of the knife holder (1) can, with a washer added between them, lock and match together to achieve an air-tight seal. A pressure gauge (23) (this part is a conventional item which needs no further elaboration) is provided in the cover body (21) and is sealed off by a transparent plastic cover (24). This pressure gauge (23) can indicate the air/gas storage volume in the capacity chamber (1) for resupply whenever necessary.

Referring to Figures 2 and 2-A, the air tap (3) is used to fill air/gas into the capacity chamber (11), thus making the capacity chamber (11) fully filled with high pressure air/gas, and is formed by joining an air-filling seat (31) and a sleeve (32). The air-filling seat (31) is a convex cylindrical body; threads are made on the outside part of the air-filling seat (31) for locking in the air tap hole (13) in the knife holder (1) and also for the sleeve (32) to be locked and matched on the air-filling seat (31). An arcuate concave groove (311) is provided on the convex position of the air-filling seat (312), and a washer (312) is placed in the concave groove (311). A through air hole (313) is provided in the central part of the air-filling seat (312), and an air input hole (321) is provided in the top of the sleeve (32). A spring (322) and a steel bead (323) are present in the sleeve (32) and then the sleeve (32) is locked on the air-filling seat (31). At usual time, the high pressure air in the capacity room (11) of the knife holder (1) can match the spring (322) to press against the steel bead (323) to make the steel bead (323) closely stick to the concave groove (311) in the air-filling seat (31) thus tightly sealing off the air-filling hole (313). When it is desired to refill air/gas into it, an air-filling tool can be inserted into the air filling hole (313) which squeezes and forces the steel bead to move back, thereby making air/gas fill the capacity chamber (11) *via* the input hole (321).

Please refer to Figures 2 and 2-B. The valve gate is composed of a push button (41) and an air output seat (42). The push button (41) comprises a limit seat (4111), a push pin (412) and a push cover (413);  
 5 the limit seat (411) is a hollow round cover body threads are made on the lower rim of the outer part of the limit seat (4111) is provided in the center of the top surface of the said cover body to allow one end of the push pin (412) is a cross-type cylinder. An  
 10 annular groove (4121) is provided in the wide part of the middle section of the push pin (412), and a washer (4122) is placed in the annular groove (4121). When the annular groove (4121) rabbets the limit seat (411), another washer (4123) is placed on  
 15 the top rim of the push pin (412), and then one end of the push pin (412) passes through the round hole (4111), thereby making the protruding post (4124) on the bottom of the push pin (412) control the air output seat (42), the protruding post (4125) on the  
 20 top of the push pin (411) lock, with its threads, the push cover (413), but before the protruding post (4125) locks the push cover (413), a spring (414) must be placed in the push cover (413).

The air output seat (42) is an element of the same structure as of the air tap (3) and can be locked from the capacity chamber (11) of the knife holder (1) in an outward-to-inward direction, the diameter of the air discharge hole (421) is slightly larger than that of the protruding post on the bottom end of the push  
 30 pin (412). When the push button (41) is depressed, said protruding post (4124) in the bottom can push the steel bead (422) down, thereby making the air/gas in the capacity chamber (11) discharged outside via air discharge hole (421) and air passage (15).  
 35 (15).

With the assembly of the above-said members, in practice, this invention is firstly opened with the seal cover (2), and is then filled with a color pigment and/or an anti-shark substance, and finally is locked  
 40 up air-tight. Then air/gas filed in from the air-filling hole (313) by the air-filling tool enters the hole to force the steel bead (323) back and then mixes with the color pigment and/or the anti-shark substance. When a diver confronts any unexpected outside  
 45 assaults he may depress the push button (41) to make the bottom-end protruding post (4124) deeply penetrate into the air discharge hole (421) in the air output seat (42) thus making the steel bead move downwards. The high pressure air/gas in the  
 50 capacity room (11) of the knife holder (1) vents out via the air discharge hole (421) and air passage (15), thereby making the water around the diver become turbid to expedite the diver's escape and avoid the pending attack; when the air pressure in the  
 55 capacity chamber (11) becomes insufficient, he may learn this from the pressure gauge (23) on the seal cover (2), so he can make a proper resupply of air/gas.

Summing the above up, the present invention has the defence usage of the diver's knife and in  
 60 addition to its excellent practicability can also be used for safe escape, when he meets any distress.

#### CLAIMS

1. A divers knife comprising a blade and a handle

65 having an air chamber therein, said chamber being closed by a removable air-tight closure member and being associated with inlet valve means through which air may be supplied to the chamber and selectively operable outlet valve means through  
 70 which air may be released from the chamber.

2. A divers knife as claimed in Claim 1, wherein said selectively operable fluid outlet valve is associated with an air outlet channel extending within and along the length of said handle and  
 75 opening at the end of said handle adjacent said blade.

3. A divers knife as claimed in Claim 1 or Claim 2 wherein the air-tight closure member is located over the end of the handle remote from the blade.

80 4. A divers knife as claimed in any one of the preceding claims wherein the inlet valve means and the outlet valve means are located towards the end of the handle remote from the blade.

5. A divers knife as claimed in any one of the preceding claims wherein there is provided a gauge for determining the pressure within the chamber.

85 6. A divers knife as claimed in Claim 5, wherein the gauge is located on the air-tight closure member.

90 7. A divers knife as claimed in any one of the preceding claims wherein the inlet valve means comprises a channel through the wall of said chamber, and a ball urged into a seat at the inner end of said channel said ball being displaceable by the entry of pressurised air into said channel  
 95 thereby to open the inlet valve.

8. A divers knife as claimed in Claim 7, wherein said steel ball is urged into said seat by means of a spring one end of which acts against the ball and the  
 100 other end of which acts against a cap located over the inlet of said channel, an inlet to said chamber being provided by an aperture in the cap.

9. A divers knife as claimed in any one of the preceding claims, wherein said outlet valve means  
 105 comprises a channel through the wall of said chamber, the inner end of said channel being closed by means of a ball urged into a seat around said inner end, and a plunger moveable to displace said steel ball from its seat thereby releasing fluid from  
 110 said chamber.

10. A divers knife as claimed in Claim 9, wherein the plunger is mounted on a push-button assembly resiliently urged to a position at which the outlet valve means is closed.

115 11. A divers knife comprising such members as a knife blade, a knife holder, a seal cover, an air tap and a valve gate of which the features are:

a knife holder having a grip part for hand grasp, in which its inner part is cut off, and threads are provided in its end to match a washer for locking the seal cover air-tight; an air tap hole and a valve gate hole for locking the air tap and valve gate are present at proper positions on the respective upper and lower sides of the end of the knife holder; a  
 120 copper tube on the side wall on which the valve gate is installed covers the knife holder to integrally form an air passage when the knife holder is ejected out; one end of the copper tube opens at the front end of the knife holder, and said air passage is subjected to

- the control of the valve gate; a seal cover having a coverbody which extends annular locking seat with threads to closely lock the end of the knife holder air-tight; a pressure gauge is provided in the inner side of the said cover body, and a transparent plastic cover seals the pressure gauge in the seal cover from the end of the seal cover to indicate the air/gas pressure in the knife holder; and air tap comprising:
- an air-filling seat which is a convex cylinder, with threads on its outer surface; an arcuate concave groove is provided on the protruding part on its top surface and is then padded with an arcuate washer, and a round hole is drilled in the center of the seat body for air/gas filling; the entire identity can be inwardly locked on the air tap hole pre-disposed in the knife holder, a sleeve, which is a hollow round cylinder, threads are made in its inner part to lock the protruding post on the top surface of the air-filling seat, a round hole is also drilled in the center of its top surface for air/gas input, a spring and a steel bead are provided in the sleeve, due to the air pressure on the knife holder and the tension of the said steel bead spring can closely choke the arcuate concave groove in the air-filling seat to avoid the leakage of air in the knife holder;
  - a gate valve comprising:
    - a push button which is a limit seat having a hollow round cover body, threads are made on its outer part to be turned into the upper section of the valve gate hole in the knife holder, a round hole is drilled on its top surface into which a push pin is inserted, said push pin is in a cross round cylinder, its lower end penetrates into the air discharge hole in the air outlet seat, its upper end can sleeve a washer to go through the round hole in the limit seat, and the threads on its top end locks the push cover, an arcuate groove is provided in the protruding body in the middle part of the push pin to sleeve a washer thus making the limit seat achieve the air-tight closure effect during the sliding of the limit seat; further the push cover is a hollow round cover body with its inner diameter slightly larger than the outer diameter of the limit seat, and a spring can be placed in said push cover to make the push cover have a bouncing back force when the push cover is depressed, a screw hole is provided in its inner top surface to lock the top end of the push pin;
    - an air outlet seat comprising a sleeve and a convex locking body; said sleeve is a hollow round cover body with threads provided inside, a round hole is drilled on its top surface for air/gas discharge, a spring and a steel bead may be present in its inner part and the air outlet seat is locked to the said convex locking body; a row of air holes are drilled in the middle part of said convex locking body, an arcuate groove is provided in the tops of the holes, an arcuate washer is placed in the arcuate groove, threads are provided on the outer part of the locking body to inwardly lock the lower section of the valve gate hole present in the knife holder to be thus corresponding to the air passage separated the push button;
- The assembly of the above-said members provides a knife tool that at the time of distress, a diver may press its valve gate down to discharge a color air/gas and/or an anti-shark substance from the knife holder to make the water surrounding him become turbid, thus achieving the object of safe escape.
12. A divers knife substantially as herein described with reference to the accompanying drawings.